REMARKS

The above-identified patent application has been reviewed in light of the Examiner's Action dated June 8, 2004. Claims 1, 4-6 and 9 have been amended without intending to abandon or to dedicate to the public any patentable subject matter. Claims 18, 19 and 20 are new. Accordingly, Claims 1-20 are now pending. As set out more fully below, reconsideration and withdrawal of the objections to and rejections of the claims are respectfully requested.

Claim 4 stands objected to on the grounds that it would be clearer if it explicitly stated that a predetermined number of write operations is completed. In the amendments set forth above, Claim 4 has been amended. In view of the amendment, it is submitted that the objection to Claim 4 should be reconsidered and withdrawn.

Claims 4-8 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. In particular, the Office Action finds that Claim 4 recites the limitation "said predetermined number" and that prior to this limitation two "predetermined numbers" are recited. In the amendments set forth above, Claim 4 has been amended. Furthermore, it is noted that each instance of "said predetermined number" in Claim 4 is explicitly associated with either a first drive or a second drive. Accordingly, it is submitted that Claim 4 is not indefinite, and the rejection of that claim should be reconsidered and withdrawn. Claims 5-8, which depend from Claim 4, were rejected as indefinite for including the deficiency of the parent claim. Accordingly, the rejections of Claim 5-8 as indefinite should be reconsidered and withdrawn for the same reasons that the rejection of Claim 4 as indefinite should be reconsidered and withdrawn.

Claims 1-5, 7-13 and 15 through 17 stand rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 6,665,743 to Benhase et al. ("Benhase"). In order for a rejection under 35 U.S.C. §102 to be proper, each and every element as set forth in a claim must be found, either expressly or inherently described, in a single prior art reference. (MPEP §2131.) However, each and every element of the rejected claims cannot be found in the Benhase reference. Accordingly, the rejections of Claims 1-5, 7-13 and 15-17 as anticipated should be reconsidered and withdrawn.

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The present invention is generally directed to reducing the amount of time required to initialize a storage system. In particular, the present invention describes issuing write related operations to each of the storage devices in the array. Furthermore, each of the write related operations concerns a first logical block address range. In accordance with embodiments of the present invention, a number of write related operations may be issued. In response to determining that each of the storage devices included in the storage array has completed at least one of the write related operations, an additional write related operation is issued to each of the storage devices. Accordingly, embodiments of the present invention utilize command queuing in order to keep the bus subsystem busy, thereby reducing the amount of time required by an array initialization procedure.

The Benhase reference is generally directed to initializing a storage space. In particular, Benhase discusses coordinating the operation of a controller or adaptor card with the operation of a storage device. (Benhase, col. 2, l. 52 – col. 3, l. 5.) Accordingly, Benhase addresses the problem of redundant initialization operations. (Benhase, col. 3, ll. 19-21.) More particularly, when storage subsystem code 32 includes a self initialization command 34, the PCI RAID adaptor 12 enters an "initialization override" state in which the PCI RAID adaptor does not perform initialization operations, and instead performs full stripe writes of the initialization data supplied by the storage subsystem controller 30. (Benhase, col. 4, ll. 20-31.) However, Benhase does not describe command queuing in order to more fully utilize the available bandwidth of the bus system as generally set forth in the pending claims. Instead, Benhase discusses sequentially issuing write operations comprising full stripes of data. Accordingly, the apparent advantage of Benhase is that it prevents a RAID adaptor from performing a redundant initialization. More particularly, according to Benhase, in the absence of the method discussed by that reference, the storage subsystem would also perform initialization and therefore overwrite any initialization information written by the RAID adaptor. (Benhase, col. 5, ll. 51-58.)

Claim 1 is generally directed to a method for initializing an array of drives. As amended, Claim 1 recites issuing a first number of write related operations to each of the drives included in

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an array of drives. Furthermore, each of the number of write related operations concerns a different logical block address, and are queued in each of the drives. Amended Claim 1 further recites determining whether each of the drives has completed at least one of the number of write operations concerning at least one logical block address range. In addition, Claim 1 recites "in response to determining that each of said drives is completed at least one of said number of write operations concerning at least one logical block address range, issuing at least one more write related operation to each of said drives in said array." As noted above, the Benhase reference does not describe queuing a number of write related operations in each drive included in an array of drives. Accordingly, for at least this reason, Claim 1 and Claims 2-5, 7 and 8 are not anticipated by Benhase, and the rejections of these claims should be reconsidered and withdrawn. Applicants note that the amendments to Claim 1 are supported by the specification, for example at p. 5, l. 8 to p. 6, l. 4 and at p. 11, l. 22 to p. 12, l. 20, and that no matter is presented.

Claim 9 is generally directed to an apparatus for initializing an array of drives. In particular, Claim 9 recites "an array of drives for storing information." The "array of drives including at least a first drive and a second drive with said first drive being associated with a higher priority than said second drive." As amended, Claim 9 further recites that "each of said drives in said array is associated with a queue operable to store a number of write commands." Claim 9 also recites a controller for controlling issuance of write operations. More particularly, the controller controls the first write operation to at least each of the first and second drives, controls the second write operation to at least the first and second drives, and controls the third write operation to at least the first and second drives. Amended Claim 9 further recites that the "third write operation is controlled to said first and second drives after at least one of said first write operation and said second write operation has been completed on at least each of said second drive and said first drive." As noted above, Benhase does not discuss an apparatus in which a number of write operations are placed in a command queue, and in which an additional write operation is controlled to the drives included in an array of drives after at least one of the queued first or second write operations has been completed. Accordingly, each and every element of Claim 9 and the claims dependent therefrom, including

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Claims 11 through 13 and 15 through 17, are not anticipated by Benhase, and the rejections of these claims should be reconsidered and withdrawn. Applicants note that the amendments to Claim 9 are supported by the specification, for example at p. 5, l. 8 to p. 6, l. 4, and at p. 11, l. 22 to p. 12, l. 20, and that no new matter is presented.

Claims 6 and 14 stand rejected under 35 U.S.C. §103 as being unpatenable over Benhase in view of Massiglia (*The RAID Book: A Storage System Technology Handbook*, 6th Ed., February 1997) ("Massiglia"). In order to establish a prima facie case of obviousness under section 103, there must be some suggestion or motivation to modify the reference or to combine the reference teachings, there must be a reasonable expectation of success, and the prior art reference or references must teach or suggest all of the claim limitations. (MPEP §2143.) As explained in detail herein, each and every element of the invention as set forth in the claims cannot be found in the cited references, whether those references are considered alone or in combination. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §103 are respectfully requested.

As noted above, the Benhase reference does not discuss a system in which write operations are queued and in which a further write operation is distributed to storage devices included in an array of storage devices after at least one of the queued write operations has been completed. The Massiglia reference does not address the deficiencies of Benhase with respect to the claimed invention. In particular, the portion of the Massiglia reference cited to in the Office Action simply shows four stripes of data across the various drives included within a RAID array. In particular, the Massiglia reference does not disclose whether the stripes of data were queued or whether additional data was provided to the individual drives after at least one of the queued write operations was completed, as generally set forth in the claims. Therefore, for at least these reasons, the rejection of Claim 6, which depends from Claim 1, and of Claim 14, which depends from Claim 9, should be reconsidered and withdrawn.

New Claim 18 is generally directed to a method for initializing an array of storage devices. Claim 18 is allowable over the cited references for at least the reasons that it recites issuing at least first and second write related operations to each of the storage devices in an array, in which the first

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write related operation concerns the first logical block address range and the second write related operation concerns a second logical block address range, and in which an additional write related operation, concerning a logical block address range not included in the first or second logical block address ranges, is issued after at least one of the at least first and second write related operations has been completed. Claim 19 depends from Claim 18 and additionally recites issuing four write related operations, and in which the additional write related operation comprises a fifth write related operation. Claim 20 also depends from Claim 18 and additionally recites placing at least one of the issued at least first and second write related operators for each of the storage devices in a command queue. Applicants submit that Claims 19 and 20 are allowable for at least the reasons that claim 18 is allowable, and for the additional patentable subject matter recited therein.

The application now appearing to be in form for allowance, early notification of same is respectfully requested. The Examiner is invited to contact the undersigned by telephone if doing so would expedite the resolution of this case.

Respectfully submitted,

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